CLIPPEDIMAGE= JP401257697A

PAT-NO: JP401257697A

DOCUMENT-IDENTIFIER: JP 01257697 A

TITLE: LIGHTNING PROTECTIVE COATED MEMBER AND ELECTRIC DISCHARGE PROTECTION METHOD

PUBN-DATE: October 13, 1989

INVENTOR-INFORMATION:

NAME	COUNTRY
COVEY, JAMES H	N/A

INT-CL (IPC): B64D045/02; B32B015/08

ABSTRACT:

PURPOSE: To make a lightning protective member light-weighted and high strength and disperse lightning current by providing first and second construction panels made of fiber graphite material connected together through pressure sensitive adhesive and a wire lattice between the panels for the lightning protective material.

CONSTITUTION: A **lightning protecting** coated member (for **aircraft**) is provided with a first panel 100 and a second panel 102, and a wire lattice 104 arranged between them. The respective panels 100 and 102 are constituted of a plurality of graphite phases 106, 108, 110, 112, 114 and 116. As for the wire lattice, for example, titanium of diameter 0.05 inch is used. For a conductive plate 200, titanium is used for preventing corrosion, for example, it is formed into 1 inch

---------- KWIC ---------

Abstract - FPAR:

CONSTITUTION: A **lightning protecting** coated member (for **aircraft**) is provided with a first panel 100 and a second panel 102, and a wire lattice 104 arranged between them. The respective panels 100 and 102 are constituted of a plurality of graphite phases 106, 108, 110, 112, 114 and 116. As for the wire lattice, for example, titanium of diameter 0.05 inch is used. For a conductive plate 200, titanium is used for preventing corrosion, for example, it is formed into 1 inch

AST Browser - L13: (65) ((shield$3 o... | JP 01257697 A | Tag_S,T,I | Doc: 1/65 | Format: CIT+Abstract+KWIC

File Edit View Tools Window Help

	Document ID	Title
1	JP 01257697 A	LIGHTNING PROTECTIVE C
2	JP 01048871 A	IONIZABLE PAINTS
3	EP 976653 A1	Lightning protection system fo
4	EP 976652 A1	Lightning protection system fo

CLIPPEDIMAGE= JP401257697A

PAT-NO: JP401257697A

Viewer

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TITLE: LIGHTNING PROTECTIVE COATED MEMBER AND ELECTRIC DI
METHOD

PUBN-DATE: October 13, 1989

INVENTOR-INFORMATION:

NAME	COUNTRY
COVEY, JAMES H	N/A

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特開平1-257697(5)

4. 図面の簡単な説明

第1図は新規な電光保護被覆部材のグラファイトパネルの断面図であり、

第2図はグラファイトパネルの平面図である。

100、102…パネル、104…格子ワイヤ、200…導電板、202…開孔。

出願人代理人 弁 理 士

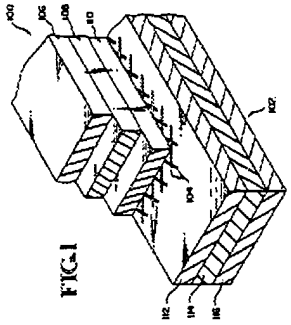

FIG.1

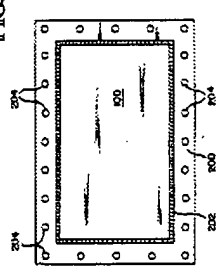

FIG.2

EAST Browser - L4: (25) (air$1plane... | US 4557961 A | Tag: S,T1 | Doc: 18/25 | Format: KWIC

File Edit View Tools Window Help

	Document ID	Title
16	US 4600619 A	Continuously wound filament
17	US 4569884 A	Sheet material, process for its
18	US 4557961 A	Light-weight, fire-retardant sh
19	US 4526421 A	Multi-passenger aircraft seat b

US-PAT-NO: 4557961

DOCUMENT-IDENTIFIER: US 4557961 A

Viewer

Times New Roman 12

al panel

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Brief Summary Text - BSTX (7):

In conventional aircraft available today, it is a common practice to form floor panels of composite sandwich-type construction, generally having a honeycomb core formed of paper treated with a fire resistant material and/or of fire resistant synthetic materials and sandwiched between upper and lower fiberglass face sheets bonded thereto by means of a conventional epoxy -type adhesive. Although the size of such panels is not critical and may be varied to meet desired conditions, the panels are commonly about 4'.times.4' in area and about 1/2" in thickness. However, such panels are commonly employed in different structural environments having different requirements in terms of, for example, load bearing capacity, strength, and/or sound deadening capacity. Thus, where the panels are employed as internal bulkheads, there is often very little load carrying capacity required; and, the degree of sound deadening characteristics required is a function of the location of the panel on the bulkhead--viz., whether the panel is to be employed adjacent a point of attachment of an airfoil, power plant or the like which serves to generate increased noise levels or, alternatively, whether it is to be employed at a region remote from any relatively troublesome sound sources. On the other hand, if the panel is to function as a floor panel, then its load bearing capacity becomes considerably more significant dependent upon whether the floor panel is for a cargo deck or for the passenger deck; and, in the latter instance, whether the panel is located in: (i) a low traffic area such as found beneath the seats in the passenger compartment; (ii) a high traffic area such as the galleys and/or passenger aisles; or (iii), in regions which bridge low and high traffic areas. Again, the particular location of the panel--i.e., whether it is in a region of

12/19/85 XR 4,557,961

United States Patent [19]

Gorges

[11] Patent Number: 4,557,961

[45] Date of Patent: Dec. 10, 1985

[54] LIGHT-WEIGHT, FIRE-RETARDANT STRUCTURAL PANEL

[75] Inventor: Friedrich J. Gorges, Bellevue, Wash.

[73] Assignee: The Boeing Company, Seattle, Wash.

[21] Appl. No.: 514,987

[22] PCT Filed: May 27, 1983

[86] PCT No.: PCT/US83/00837

§ 371 Date: May 27, 1983

§ 102(e) Date: May 27, 1983

[87] PCT Pub. No.: WO84/04727

PCT Pub. Date: Dec. 6, 1984

[51] Int. Cl.⁴ B32B 3/12

[52] U.S. Cl. 428/117; 52/806; 428/408; 428/421; 428/920

[58] Field of Search 52/806; 428/71, 73, 428/116–118, 920–921, 408, 421

[56] References Cited

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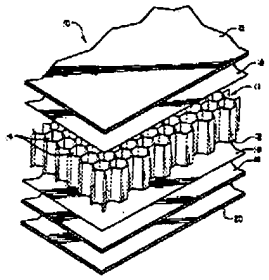
Primary Examiner—Henry F. Epstein

Attorney, Agent, or Firm—Hughes & Cassidy

[57] ABSTRACT

A composite, lightweight, fire-retardant laminar structural panel (10, 10', 10", 30) of the present invention comprising: (i) a sheet-like central honeycomb core (11) formed of aluminum, paper treated to improve its fire resistance characteristics, or the like; (ii) upper and lower imperforate face sheets (15, 16) formed of lightweight fibrous materials impregnated with a phenolic resin; (iii) a pair of upper and lower phenolic adhesive films (18, 19) interposed between the honeycomb core (11) and respective ones of the imperforate face sheets (15, 16) for adhesively bonding the face sheets (15, 16) to opposite sides of the core (11); and (iv), a fire-retardant coating (20) comprising a copolymer of vinylidene fluoride and hexafluoropropene applied to at least the exposed surface of the lower face sheet (16). In certain of the exemplary forms of the invention herein described, the composite, laminar panels (10, 10', 30) are designed to provide one of a plurality of different load bearing capacities dependent upon the type of use to which the panel is to be put; while in other exemplary forms of the invention, a given panel includes regions of differing density and/or of different numbers of face sheet plies; but, which is of uniform overall thickness so as to provide relatively high load bearing capacities in high traffic and/or high load environments and relatively low load bearing capacities in low traffic and/or low load environments.

33 Claims, 6 Drawing Figures



EAST Browser - L4: (25) (air$1plane... | US 4600619 A | Tag: S | Doc: 16/25 | Format: KWIC

File Edit View Tools Window Help

	Document ID	Title
14	US 4896160 A	Airborne surveillance platfor
15	US 4620890 A	Method of making a fluted cor
16	US 4600619 A	Continuously wound filament
17	US 4569884 A	Sheet material, process for its

US-PAT-NO: 4600619

DOCUMENT-IDENTIFIER: US 4600619 A

TITLE: Continuously wound filament structure for use in noise attenuation

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Detailed Description Text - DETX (7):

One suitable construction of a honeycomb core acoustic treatment structure according to the present invention consists of a porous inner skin wound of Kevlar aramid filaments in a wet winding process with an epoxy resin. The core was a low-density aluminum flex-core and a solid outer skin of graphite filaments in an epoxy resin was wound over the flex-core. The actual winding was accomplished using a numerically controlled McClean-Anderson filament-winding machine and an aluminum lay-up mandrel. The inner skin consisted of one ply of Kevlar wound at .+-.30 degrees. The Kevlar was wet wound using three tows of 380 denier Kevlar, and an epoxy resin. A controlled spacing of 0.060 inches between adjacent tows was provided to produce the desired perforations. After completion of winding, the inner skin was cured at 250 degrees F. The aluminum flex-core was reticulated with adhesive and positioned on the inner skin. Adhesive was then applied to the exposed core surface and the outer skin was wound in place. The outer skin was comprised of a filament winding of eight plys, three at 90-degree orientation, two plys at .+-.45 degrees, and three more plys at 90-degree orientation, using 12 tows of Union Carbide 3k graphite fiber and an epoxy resin. The inner core, aluminum flex-core, and outer skin were co-cured at 325 degrees F. While the sample was wet wound, it would be possible to utilize preimpregnated filaments. The use of preimpregnated filaments would produce a more accurate control of the winding and spacing of the perforated inner skin since resin placement would be more controlled. However, the cost of the preimpregnated material would increase substantially over the wet-wind process. The composite material diffuser inlet of the present invention could have a considerable weight

United States Patent [19]

Chee et al.

[11] Patent Number: 4,600,619

[45] Date of Patent: Jul. 15, 1986

[54] CONTINUOUSLY WOUND FILAMENT STRUCTURE FOR USE IN NOISE ATTENUATION ELEMENT

[75] Inventors: Wan T. Chee; George W. Quigley, both of Bellevue, Wash.

[73] Assignee: The Boeing Company, Seattle, Wash.

[21] Appl. No.: 687,905

[22] Filed: Dec. 31, 1984

[51] Int. Cl.[4] B32B 3/12

[52] U.S. Cl. 428/118; 156/173; 156/292

[58] Field of Search 428/73, 116, 131, 117, 428/118; 156/173, 197, 292

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FOREIGN PATENT DOCUMENTS

EP0087446A1 11/1982 European Pat. Off. 428/116

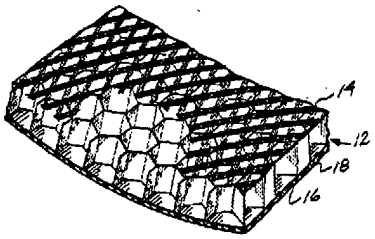
Primary Examiner—Henry F. Epstein

Attorney, Agent, or Firm—Christensen, O'Connor, Johnson & Kindness

[57] ABSTRACT

An engine inlet sound diffusion structure for use with a turbofan engine is constructed of nonmetallic composite materials. An inner perforated skin of the diffuser is made up of continuously wound composite material filaments. A honeycomb core is sandwiched between the inner porous skin and a nonporous outer skin also comprised of continuously wound filaments. The perforations in the inner skin are formed directly in the skin by programmed placement of the filaments during the winding process. The formation of the perforations can be assisted by the use of a mandrel having spikes formed on its outer surface.

6 Claims, 4 Drawing Figures



EAST Browser - L4: (25) (air$1plane... | US 4061812 A | Tag: S | Doc: 22/25 | Format: KWIC

File Edit View Tools Window Help

	Document ID	Title
20	US 4378170 A	Panel edge potter
21	US 4249976 A	Manufacture of honeycomb sa
22	US 4061812 A	Honeycomb-laminate compos
23	US 4044253 A	Non-destructive inspection of

US-PAT-NO: 4061812

DOCUMENT-IDENTIFIER: US 4061812 A

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Brief Summary Text - BSTX (5):

Typical prior art composite structures, generally used as interior panels in aircraft, watercraft, etc., particularly where light-weight materials are desirable, comprise a decorative surface bonded to a laminate on a honeycomb core. Such a core material known in the prior art for a "sandwich" composite generally utilizes a honeycomb structure whose cells have hexagonal shape (hereinafter, for simplicity, "honeycomb" structure). The cells of the honeycomb structure can be unfilled or can be filled with materials such as a polurethane foam or a phenolic microballoon-filled epoxy potting compound. Layers of materials, for example, pre-imgregnated glass fibrous materials are then adhesively laminated to the core and a decorative surface, for example, produced by silk screening can then be placed thereon in order to produce, for example, a panel material which can be used in the interior of aircraft, watercraft, etc. In the prior art a transparent polyvinyl fluoride film has been bonded, using polymethylmethacrylate, to the decorative surface to provide protection. The material generally bonded to the honeycomb core structure employed in the prior art is a glass cloth material pre-impregnated with an epoxy resin and on bonding of this to the honeycomb core structre, the glass cloth pre-impregnated with the epoxy resin can be subjected to a texturizing operation to provide a surface texture thereto.

SR

XR 4,061,812 x2009E

(6)

United Stat x2006R x2002D

Gilwee, Jr. et al.

[11] **4,061,812**

[45] **Dec. 6, 1977**

[54] **HONEYCOMB-LAMINATE COMPOSITE STRUCTURE**

[75] Inventors: William J. Gilwee, Jr., Sunnyvale; John A. Parker, Los Altos, both of Calif.

[73] Assignee: The United States of America as represented by the Administrator of the National Aeronautics and Space Administration, Washington, D.C.

[21] Appl. No.: 698,646

[22] Filed: June 23, 1976

[51] Int. Cl.[2] B32B 3/12

[52] U.S. Cl. ..... 428/117; 106/15 FP; 260/2.5 N; 260/2.5 R; 428/290; 428/71; 428/920; 428/73

[58] Field of Search ..... 106/15 FP; 260/2.5 N, 260/2.5 R; 428/71, 73, 116, 117, 118, 920, 921, 310-313, 314-315, 290

[56] References Cited

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Primary Examiner—George F. Lesmes
Assistant Examiner—Henry F. Epstein
Attorney, Agent, or Firm—Darrell G. Brekke; Armand McMillan; John R. Manning

[57] **ABSTRACT**

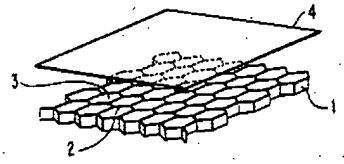
A honeycomb-laminate composite structure comprising

a. a cellular core of a polyquinoxaline foam in a honeycomb structure, and

b. a layer of a non-combustible fibrous material impregnated with a polyimide resin laminated on the cellular core,

a process for producing the honeycomb-laminate composite structure and articles containing the honeycomb-laminate composite structure.

12 Claims, 3 Drawing Figures



	Document ID	Title
65	US 5448161 A	Transformer-coupled photodic
66	US 5418330 A	Apparatus for grounding an inf
67	US 5417385 A	Structural component
68	US 5407743 A	Zinc oxide coated substrates

US-PAT-NO: 5417385

DOCUMENT-IDENTIFIER: US 5417385 A

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Fig.10.

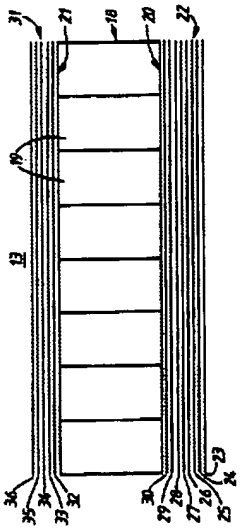
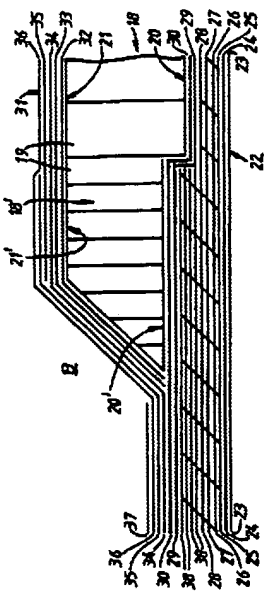


Fig.11.



	Document ID	Title
18	EP 269775 A1	Protection device against light
19	EP 227122 A2	Lightning protection apparatus
20	FR 2590421 A1	Device for protection from lig
21	EP 221202 A1	Lightning protection for aircra

APPL-NO: FR08516937

APPL-DATE: November 15, 1985

EUR-CL (EPC): H01H085/046; H01L023/62
US-CL-CURRENT: 338/322

ABSTRACT:

This device for electrical protection of a specified number N of paths by fusible screen-printed resistor makes it possible to protect apparatuses from voltages of the order of 115V through the melting of the resistor, but withstands much higher voltages 600V to 2000V for short periods, without notable variations in the ohmic value of the resistor.

It includes a substrate 4 supporting, for each electrical path, two conductive elements 2, 3 to be interconnected and deposited by silk screen printing onto the said substrate and a fusible resistor 1 deposited by silk screen printing and connecting the two conductors together. The device is characterised in that each resistor includes two distinct and separately silk-screen printed layers 11, 12 for resisting high voltage spikes for a specified short period duration. The conductors 2, 3 consist of a silk-screen printed conductive paste layer, the resistor 1 being connected to the conductors by contacting the former over virtually the entire width of the conductors.

Application for the protection of computers aboard aircraft. <IMAGE>

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FIG_1-A

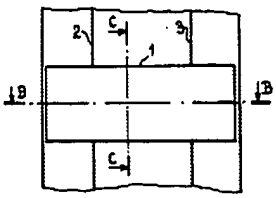


FIG_1-C

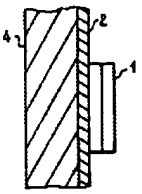
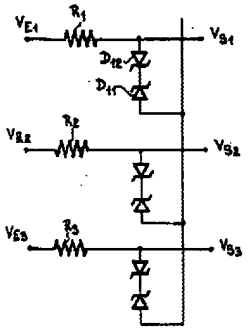


FIG_1-B

FIG_2



EAST Browser - L4: (25) (air$1plann... | US 5037498 A | Tag: S | Doc: 11/25 | Format: KWIC

File Edit View Tools Window Help

	Document ID	Title
9	US 5284702 A	Low fuming phenolic resin pre
10	US 5238725 A	Method for forming a structure
11	US 5037498 A	Continuous honeycomb panel
12	US 5034751 A	Airborne surveillance platform

US-PAT-NO: 5037498

DOCUMENT-IDENTIFIER: US 5037498 A

ng method

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Brief Summary Text - BSTX (8):

As the surface materials 20a and 20b there are used plates and aluminum, but for aircraft there are used sheet-like prepregs obtained by impregnating fabrics or short fibers such as glass, aramid or carbon fabrics or fibers with phenols or epoxy resins followed by forming in the shape of sheet. Surface materials 20a and 20b of prepreg contain a thermosetting resin and have plasticity at room temperature. Therefore, if the surface materials 20a and 20b are laminated to both surfaces of the honeycomb core member 10 followed by the application of pressure and heat, the surface materials 20a and 20b will be bonded to the honeycomb core member by thermosetting of the resin which has been impregnated into the surface materials to form a honeycomb panel 1.

upper hot plate having air holes for the ejection of high-temperature air downwards and adapted to float by a current of air.

Thus, according to the present invention, a band-like blank having a laminated structure with a honeycomb member sandwiched in between upper and lower surface materials of prepreg is subjected to pressurizing and heating under step feed, whereby a long honeycomb panel can be obtained continuously using a small-sized molding apparatus.

If necessary, moreover, thermosetting is accelerated by subjecting the thus-formed long honeycomb panel to additional heating. This additional heating apparatus utilizes a high-temperature air bearing, so during passing through the apparatus, the honeycomb panel is improved in its evenness and flatness accuracy, thus affording a high quality honeycomb panel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a pressurizing and heating step in the molding method of the present invention;

FIG. 2 is a perspective view showing a step of relieving pressure and feeding a blank;

FIG. 3 is a perspective view showing a repressurizing and heating step after completion of the feed;

FIG. 4 is a perspective view showing a step of relieving pressure and again feeding the blank;

FIG. 5 is a sectional view showing an additional heating step and an apparatus used for the same step;

FIG. 6 is a perspective view showing the structure of a honeycomb panel; and

FIG. 7 is a view explanatory of a conventional molding method.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be described hereinafter with reference to the drawings.

FIG. 1 to 4 illustrate operation steps in the molding method according to the present invention, of which FIG. 1 shows a first step.

A honeycomb panel blank 1a comprising a band-like honeycomb core member 10 and band-like surface materials 20a, 20b of a prepreg laminated to both upper and lower surfaces of the honeycomb core member 10 in a sandwiched fashion is fed continuously from the right to the left in FIG. 1 together with overlying and underlying release films 21a, 21b of polyester or polypropylene.

Halfway of the feed path of the band-like blank 1a there is disposed a continuous molding apparatus indicated wholly by the reference numeral 50. The continuous molding apparatus 50 is provided with an upper hot plate 52 and a lower hot plate 54. The lower hot plate 54 is fixed, while the upper hot plate 52 is constructed so that it can apply pressure P toward the lower hot plate 54 using a suitable means. The upper and lower hot plates 52, 54 are constructed to have the same shape and size. Since honeycomb panels are usually about 120 cm (4 feet) in width, the hot plates are set at about 120 cm in both width W and length L.

The blank 1a which has reached the molding apparatus 50 is sandwiched in between the upper and lower hot plates 52, 54 and subjected to pressurizing and heating for a certain time under the application of pressure P to the upper hot plate 52. The degree of pressurizing and that of heating are suitably selected according to the material of the blank 1a. For example, when the honeycomb core member 10 has a thickness T of 18.2 mm and the surface materials 20a and 20b are each a prepreg 0.25 mm thick obtained by impregnating glass fibers with a phenolic resin, the pressure P, heating temperature and processing time are set at about 3 kg/cm², about 130° C. and about 3 minutes, respectively.

After the pressurizing is over in about 3 minutes, the pressure P of the upper hot plate 52 is reduced to zero and the blank 1a is fed in the direction of arrow F by a suitable means, as shown in FIG. 2. The length F_1 for each feed is set, for example, at about 15 cm. The feed length F_1 corresponds to 12.5% of the length, L = 120 cm, of each hot plate. An oblique line portion 1b in FIG. 2 corresponds to the area of each of the upper and lower hot plates 52, 54 and it is a semi-finished product after subjected to the first heating and pressurizing.

After completion of the feed F_1 of about 15 cm, the blank 1a is stopped and, as shown in FIG. 3, the pressure P is again applied to the upper hot plate 52.

The pressurizing and heating of this time are the same as in FIG. 1. The blank 1a is subjected to pressurizing at about 3 kg/cm² and heating about 130° C. for 3 minutes or so.

When the pressurizing is over in about 3 minutes, the pressure P of the upper hot plate 52 is reduced to zero and the blank 1a is fed in the direction of arrow F, as shown in FIG. 4. This feed length F_1 is also set at about 15 cm. By this step there is completed the molding of a semi-finished product 1c which has been subjected to the second application of pressure and heat.

By repeating the above steps there is completed a honeycomb panel product 1e. If the length L of the upper and lower hot plates 52, 54 is 120 cm, a single pressurizing time is 3 minutes and the feed length F_1 is 15 cm, an average feed rate is 5 cm/min. While the blank 1a passes through the molding apparatus 50, it is pressurized eight times, so the total pressurizing and heating time is 24 minutes.

The number of times of pressurizing and the total pressurizing and heating time can be adjusted according to the kind of the thermosetting resin to be impregnated into the surface materials 20a and 20b, and it is easy to determine the pressurizing and heating time required for completing the product 1a.

By the above process there can be obtained a long honeycomb panel continuously, which is cut into a predetermined length to obtain the final product.

Certain material of the honeycomb panel and kind of the thermosetting resin require a longer time until completion of thermosetting. This problem can be remedied by prolonging the passing time through the molding apparatus 50 or by enlarging the length L of the hot plates 52, 54. However, the former results in that the average feed rate becomes lower, leading to deterioration of productivity, and the latter results in that the equipment becomes too large, leading to deterioration of cost performance.

In the present invention, to avoid such inconveniences, there is provided an additional heating step which follows the continuous molding steps, and where required, the honeycomb panel which has gone through the molding steps is subjected to additional heating and the flatness of the panel is corrected, thereby attaining a continuous molding of honeycomb panel with a higher accuracy.